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ABSTRACT

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Recreation Activity Clustering: Behavioral and Management Implications

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ABSTRACT

An alternative method for predicting recreation use patterns is explored. A factor analytical technique is used to determine if patterns and recreation clusters exist that can be used in estimating response to new kinds of recreation developments. Analysis of 45 outdoor recreation activities is presented with 5 recreation clusters developed. Socioeconomic characteristics are related to cluster participation, and intercluster participation is examined. A stratified random sample of Iowa residents 12 and older was used. Management implications are discussed.

KEYWORDS: Recreation research management, substitutability, interchangeability, recreation use patterns, recreation behavior

RECREATION ACTIVITY CLUSTERING: BEHAVIORAL AND MANAGEMENT IMPLICATIONS[1]

The planning and implementing of recreation programs has involved considerable uncertainties. The construction of new facilities or modification of existing facilities has evolved from a planning process that has included the study of public preferences and use patterns, cost estimates, the relationships of the planned activities to existing facilities, and related considerations. The estimates of probable use are extremely important in planning.

Traditionally, these use estimates have been developed by use of representative sampling techniques and by then projecting these patterns on the basis of expected changes in the socioeconomic composition of the population. Although useful, this approach has shortcomings and has not permitted very accurate predictions, especially when new facilities are constructed or new types of activities become available. A better understanding of the recreation experience, of the importance of that experience to the recreationists, and of the projections made must be achieved. As Lime (1972:198) has stated:

> If managers are to know how to manage their lands in order to maximize user satisfaction, they must, in part, know who their clientele are...and know something about what these people like and dislike. Learning about their clientele implies the need to listen not only to the people who visit the area but also to those who do not come but still have an interest in it.

Because of our inability to predict future leisure behavior with any great accuracy by existing models, new approaches must be explored. A

number of authors have expressed a need for the development of recreation activity groupings that will permit activity substitutability capable of fulfilling the same needs (Burch, 1969; Brown et al., 1973; Bishop, 1970; Ferriss, 1970; Field and O'Leary, 1973; Burdge and Field, 1972; Hendee and Burdge, 1974). If the recreation clusters or types can be identified, it may be possible that the recreationists could substitute one recreation activity for another activity within the same cluster. Once the clusters are identified, the characteristics of the participants can be determined, and recreation profiles generated that should aid researchers and help to solve some recreation management problems.

The American public has been characterized by its faddishness (Meyersohn and Katz, 1957), and, in discussing the faddishness of urban recreation, Rodger (1971:373) concluded that its "changing nature is impossible to predict." If this is the case, the development of recreation clusters that can fulfill the needs of people may improve the predictive ability. It may be possible to predict participation in a cluster of activities more accurately than to predict participation in individual recreation activities.

Present participation models do not allow for new recreation activities, nor are they useful when facilities are expanded or new ones developed. If stable dimensions of leisure behavior are identified, there could be considerable achievement in the leisure field. As Bishop (1970:160-161) has stated:

> Methodologically, the identification of such dimensions could reduce, in certain kinds of studies, the number of leisure activities that the researcher has to deal with; he could focus on a few basic categories instead of a large number of separate activities. Theoretically, we can assume that

> leisure behavior has economic, psychological, and sociological determinants and consequences; knowing some of the more basic dimensions or categories of that behavior could suggest some fruitful hypotheses and directions for leisure research. Particularly, knowledge of the factorial similarity of leisure activities should improve the practitioner's ability to provide desired recreation activities, especially when this involves substituting one activity for another.

The substitutability of recreation activities has not had extensive study. Moss and Lamphear (1970) conducted research on the relationship between personality factors and the ability to substitute recreation activities to meet the needs and drives of people. They factor-analyzed a number of outdoor recreation activities and then related these clusters to a number of human-needs factors. Different needs were related to activities in different clusters. These findings indicate that recreation activities do cluster into meaningful groups and that the recreation types were related to certain measurable human needs.

Activity types or clusters have been found in an increasing number of studies, although different activities and different aggregrate populations have been used (Proctor, 1962; Burton, 1971a, 1971b; Hendee et al., 1971; Holme and Massie, 1970; Bishop, 1970; Witt, 1971; Tatham and Dornoff, 1971; Romsa, 1973; Yoesting, 1974; Hendee and Burdge, 1974; O'Leary et. al., 1974).

If distinct recreation clusters can be identified by factor analysis, cluster analysis, or other clustering techniques, then we can have better knowledge of recreation participation behavior. Once these recreation

clusters are obtained, the characteristics of the participants within each cluster can be determined to see if there are distinctive features to identify the recreation clusters. As Romsa (1973:35) has indicated:

> The value of such an approach is readily seen. Consumption patterns can be clustered into manageable, fairly homogeneous recreational activity groups. The demand for each group can then be inferred, and policy formulated on the basis of these demands. Furthermore, the relationships between socioeconomic indices and the consumption patterns are shown. Thus, as the indices change, adjustment on the supply can be made as required.

In addition to the socioeconomic characteristics that may distinguish a recreation cluster, the overlap of participation among recreation types would further clarify the behavior of respondents. Questions to be asked include: Are people active in more than one recreation cluster? If they participate in activities in more than one cluster, is there a pattern to the overlap, or do they participate at random? When a person participates in an activity in a particular recreation cluster, is it more likely that he or she will participate in a number of activities within that cluster?

The purpose of this study is to determine if recreation clusters exist; if so, to analyze the socioeconomic characteristics of participants who compose the clusters and to study the overlap of participation among the recreation clusters. This information will provide a clearer understanding of the leisure behavior of people and enable more accurate planning on the part of resource managers.

PROCEDURES

Sample

The universe for this study was all persons residing in the State of Iowa during the Fall, 1970, who were 12 years of age and older. A total of 2192 respondents were interviewed personally. A stratified random sample was used to determined their participation in 45 outdoor recreation activities from Labor Day 1969 to Labor Day 1970. See Table 1 for a description of the socioeconomic characteristics of the sample.

Development of Recreation Clusters

Respondents were asked to indicate whether or not they participated in 45 outdoor recreation activities. The "yes" or "no" responses were then subjected to the principal-components, factor-analytical techniques with the varimax rotation (Harmon, 1967; Nunnally, 1967). The results of this analysis indicate the degree to which activities can be grouped into recreation clusters on the basis of participation by the respondents.

Five factors were specified on the basis of results of a subsample on the larger population (Yoesting, 1974). There was no theoretical justification specified for the activity selection. The data, therefore, provided the initial clustering of factors. A predetermined factor-loading cutoff value of 0.4 was specified for initial inclusion of the activity on the factor. Activities were permitted to remain on all factors if the 0.4 criterion was on more than one factor. Of the 45 factors, 34 met the

minimum factor-loading requirement on one or more factors. The five recreation clusters had 13, 6, 7, 5, and 3 activities, respectively. The factors and their loadings are shown in Table 2. The asterisk (*) beside the factor loading indicates that activity's inclusion in the recreation cluster. Table 3 indicates the classification of the outdoor recreation activities. Each factor is labeled on the basis of activities that existed in each cluster.

Factor I *(Games and Sports)* consists of 13 activities and involves physically active pursuits. The activities involve a fast pace or at least are "action oriented." A number of the activities involve movement in the sense of transporting the person from one place to another, as in bicycling, horseback riding, motorcycling, or winter activities of sledding, tobogganing, or ice skating. Both winter and summer activities are present to support the cross-season substitutability.

Factor II *(Hunting and Fishing)* includes 6 activities that require an open-country environment. Hunting and fishing activities predominate and include winter and summer seasons. Some skill is an advantage to the participants, but not a necessity, and all 6 activities require some equipment.

Factor III *(Nature Appreciation)* consists of 7 activities. They involve unorganized pursuits that take place in the "natural" environment. The activities can be an individual or group involvement and do not require a specified "playground." Participation requires minimal expense or skill.

Factor IV *("Motorized" Activity)* is composed of five activities. Four of the five activities require moderate-to-heavy investments by the user, swimming being the exception. Swimming in a natural environment is closely related to motorboating-skiing, and all activities require some amount of skill. The activities can be individual or in small groups. From a substitutability point of view, there are both summer and winter activities involved.

Factor V *(Unmotorized Travel)* consists of 3 activities that are water oriented during the summer, with snow skiing during the winter. They all require some user skill and require a moderate-to-large financial outlay by the user. These activities tend to be associated with "cultured" high-status groups.

A coefficient of reliability by means coefficient alpha (Cronbach, 1951; Bohrnstedt, 1969) was used as a determination of internal consistency. An alpha of .80, .60, .65, .54 and .32, was obtained for Factors I through V, respectively.

The 11 recreation activities that failed to load on any of the factors are considered not unique to any particular cluster. They are, therefore, not used in the rest of the analysis.

RESULTS

Socioeconomic Characteristics Correlated With Factors

A cluster score was calculated for each respondent. If the respondent participated in one or more of the activities in a cluster, a

score of 1 was assigned. If the respondent participated in none of the activities in a cluster, a score of 0 was assigned. The 1, 0 score for each cluster was correlated with seven sociodemographic variables. The correlations are shown under A in Table 4. Because of the large sample, a relatively small correlation is statistically significant.

The magnitude of the correlation coefficients is small, although many are significant. Age is inversely related to participation in all factors, with the correlation between age and *games and sports* showing the greatest magnitude. Age is a less important variable with *nature appreciation* and *unmotorized travel*. The younger persons are more likely to participate in all recreation activities.

The sex of the respondent does have an influence on participation. Males are more likely to participate in *games and sports*, *hunting and fishing*, and *unmotorized travel*, but only *hunting and fishing* was statistically significant. Females are more likely than males to participate in *nature appreciation*. There is no sex difference of participants in *motorized activities*.

Size of family is related positively to participation in all five factors, although it is not statistically significant with participation in *unmotorized travel*. Residence of the respondents while they were ages 12-17 was related to participation in *games and sports* and *motorized activities*. In both instances, participation in activities in the two factors was more likely if the persons were from urban areas. When present residence

of the respondents is considered, those from urban areas are more likely to participate in all recreation types except *hunting and fishing*, but statistically significant differences are found only for participation in *nature appreciation* and *motorized activity*. Income and education are statistically significant with all recreation types except for education and participation in *hunting and fishing*.

A factor score also was calculated by determining the total number of activities in which the respondent participated for each recreation cluster (Table 4, Correlations B). The correlations are of a similar magnitude and direction as are the correlations based on yes-no responses.

Recreation Cluster Participation Overlap

The degree of overlap in participation among recreation clusters was determined. Data in Table 5 show the percentage of the total sample (N= 2192) that had an overlap of participation between any two recreation clusters. Each respondent participates, on the average, in 2.5 clusters. The greatest overlap is between *games and sports* and *nature appreciation* and would be expected because these two types have the highest participation. There does not seem to be any regular pattern to the overlap on the part of the respondents. As an aggregate, persons in all recreation clusters do, to some extent, participate in other recreation types. For example, if we analyze those persons who participate in *games and sports*, we find variation in the distribution of participation. These respondents are most likely to also participate in *nature appreciation* (96%), *motorized*

activities (67%), *hunting and fishing* (55%), and finally *unmotorized travel* (10%). These and the other participation patterns can be seen by data presented in Table 6. The distribution of the number of different activities in which respondents participated by recreation cluster is found in Table 7.

DISCUSSION AND APPLICATION

Five stable dimensions of leisure behavior have been presented from a statewide random sample of respondents of age 12 and older. These recreation clusters were produced from 45 outdoor recreation activities. These recreation types were labeled *games and sports, hunting and fishing, nature appreciation, motorized activities* and *unmotorized travel*. Socioeconomic characteristics of the respondents and their families were related to participation in the recreation clusters, indicating that there are some differences in the characteristics of participants and that there is some difference in the overlap of participation between recreation clusters.

The existence of recreation clusters has important implications for development and modification of recreation facilities. It is expected that participants in an activity within a recreation cluster would substitute another activity within the same cluster if the activities in which they wanted to participate were not present, but others were available.

The recreation clusters provide at least a partial basis for estimating probable response to new kinds of recreation facilities in a given geographic region--a critically important factor in planning new facilities that cannot be estimated directly from current-use patterns and existing demand projections. None of the existing models will permit accurate projections of use of new facilities that would be developed. But using the recreation clusters, it is implied that new kinds of facilities primarily will be used by persons already participating in other activities within the same factor. For example, if a water-oriented facility is developed, those persons who participate in the various forms of hunting will likely become those who will fish in the new facility. Recreation clusters may make it feasible to use participation figures for related activities to obtain crude, but useful, estimates of probable participation in new activities.

The recreation-cluster approach also provides a partial basis for decisions about the specific types of activities that should be provided at specific recreation sites. Two models can be presented. One would be for a relatively isolated recreation area to serve the needs of the total population of the surrounding area; the second would involve the integration of a regional system, which would provide the facilities needed with the region.

The single, isolated facility might best provide a compatible combination of activities from several recreation clusters. Compatibility

must involve both the relations among user groups and the physical and ecological characteristics of the recreation site. Rather than to provide a number of activities from a particular recreation cluster, the manager-planner should select an activity or a minimum of activities from each recreation cluster. A planner may, for example, develop a facility to provide the following:

Volleyball	*Games and Sports*
Fishing	*Hunting and Fishing*
Nature Walks and Family Picnics	*Nature Appreciation*
Swimming	*Motorized Activity*
Sailing, Canoeing	*Unmotorized Travel*

This recreation activity mix would provide a more useful single facility development than would a heavy concentration of activities from any one recreation cluster.

The integrated regional model would require the cooperation of a number of recreation managers within a given geographic region. There could be a specialization of individual facilities with a concentration of one or two recreation clusters designated for development at a specific geographic area. For example, one facility might concentrate on bicycle trails, baseball-softball, horseback riding trails, and swimming in a pool (all from *Games and Sports*, and another facility would provide for archery, trapshooting, fishing, etc. (all from *Hunting and Fishing*). Other concentrations might include facilities focused on hiking, bird

watching, and nature photography, while another facility focused on power boating, swimming in the natural environment, snowmobiling, and a highly developed camping facility.

Because the user groups require quite different perspectives, the minimum of interference between competing activities must be designed into the program. Specific sites must be developed to take advantage of complementary facility needs. For example, roads to boat ramps could serve as snowmobile trails to enable snowmobilers to use lakes. This could reduce the conflict between incompatible activities. This kind of specialization necessarily requires that the location be relatively close to serve the population under question and that the physical facilities have the appropriate characteristics to provide the kinds of activities needed.

Further research must be completed to determine the degree of substitutability of recreation activities within a recreation cluster. To this point, it is speculation. In further explaining the leisure behavior we must know what motivates the person to participate in activities within a recreation cluster and understand the satisfactions derived from this experience. As there is a greater expansion of recreation alternatives and facilities, resource planners must consider the entire range of consequences of particular alternative development plans. Only through a greater understanding of leisure patterns and behavior can we meet the real needs of the recreationists.

FOOTNOTES

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Table 1. Socioeconomic Characteristics Distribution of Iowa Sample.

Characteristics	Number	Percent
Age		
12-17	359	16.4
18-24	230	10.5
25-44	640	29.2
45-64	608	27.7
65+	354	16.1
Sex		
Male	1041	47.5
Female	1151	52.5
Persons in Household		
1	186	8.5
2	632	28.8
3	374	17.1
4	382	17.4
5	286	13.0
6	168	7.7
7+	164	7.5
Residence Age 12-17		
Farm	910	41.5
Rural Nonfarm	101	4.6
< 2500	368	16.8
2500-9999	251	11.5
10,000-49,999	228	10.4
50,000+	334	15.2
Education		
8 and less	578	26.4
9-11	439	20.0
12	747	34.1
13-15	245	11.2
16+	183	8.3

Table 1. Socioeconomic Characteristics Distribution of Iowa Sample. (Cont.)

Characteristics	Number	Percent
Family Income		
$3000	278	12.7
3000-5999	354	16.1
6000-7999	370	16.9
8000-9999	413	18.8
10,000-14,999	502	22.9
15,000-24,999	231	10.5
25,000+	44	2.0
Present Residence		
Open country	629	28.7
< 2500	405	18.5
2500-9999	345	15.7
10,000-49,999	334	15.2
50,000+	478	21.8

. Relationship of Socioeconomic Characteristics to Participation in a Recreation

conomic teristics	Recreation Clusters									
	Games & Sports		Hunting & Fishing		Nature Appreciation		Motorized Activities		Unmotorized Travel	
	A	B	A	B	A	B	A	B	A	B
	-144**	-164**	-101**	-092**	-062*	-064**	-126**	-111**	-047*	-045*
	-033	-012	-071**	-083**	047*	049*	001	-017	-032	-046*
Family	133**	129**	088**	070**	037*	042*	086**	078**	025	032
ce 12-17	075**	074**	-004	-025	027	018	065**	074**	032	018
on	061*	-007	-017	-005	044*	061*	046*	060*	044*	047*
	109**	093**	056*	055*	063*	082**	100**	105**	089**	098**
Residence	001	017	-031	-031	042*	-001	036*	050	018	009

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Table 5. Percentage of Total Population Who Participated in Activities in Two Recreation Clusters

	Games & Sports	Hunting & Fishing	Nature Appreciation	Motorized Activities	Unmotorized Travel
Games and Sports	----				
Hunting and Fishing	37.3	----			
Nature Appreciation	65.5	42.9	----		
"Motorized" Activity	45.9	31.9	49.0	----	
Unmotorized Travel	6.9	5.3	7.0	6.6	----

Table 6. Percentage Participation in One Recreation Type by Participation in Another Recreation Cluster

Recreation Cluster	Games & Sports N=1496	Hunting & Fishing N=993	Nature Appreciation N=1980	Motorized Activities N=1107	Unmotorized Travel N=158
Games and Sports	----	54.7	96.0	67.2	10.2
nting and Fishing	54.7	----	94.8	70.4	11.7
Nature Appreciation	96.0	94.8	----	54.2	7.7
"Motorized" Acitivty	67.2	70.4	54.2	----	13.0
Unmotorized Travel	10.2	11.7	7.7	13.0	----

Table 7. Distribution of the Number of Activities in Which Respondent Participated by Recreation Clusters

Number of Activities	Recreation Clusters: Games & Sports		Hunting & Fishing		Nature Appreciation		Motorized Activities		Unmotorized Travel	
	N	%	N	%	N	%	N	%	N	%
0	696	31.8	1199	54.7	212	9.7	1085	49.5	2034	92.8
1	386	17.6	623	28.4	336	15.3	568	25.9	140	6.4
2	238	10.9	216	9.9	457	20.8	326	14.9	13	0.6
3	198	9.0	93	4.2	543	24.8	150	6.8	5	0.2
4	148	6.8	45	2.1	343	15.6	49	2.2		
5	121	5.5	11	0.5	198	9.0	14	0.6		
6	91	4.2	5	0.2	83	3.8				
7	96	4.4			20	0.9				
8	77	3.5								
9	68	3.1								
10	39	1.8								
11	26	1.2								
12	7	0.3								
13	1	0.0								
	2192		2192		2192		2192		2192	
Mean Number of Activities	3.94		1.18		2.97		1.75		1.15	

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